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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/894,460	06/28/2001	Kevin G. Donohoe	400.100US01	6410

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LEFFERT JAY & POLGLAZE, P.A.
P.O. BOX 581009
MINNEAPOLIS, MN 55458-1009

EXAMINER

ANYA, IGWE U

ART UNIT PAPER NUMBER

2825

DATE MAILED: 09/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/894,460

Applicant(s)

DONOHOE, KEVIN G.

Examiner

Igwe U. Anya

Art Unit

2825



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 June 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-56 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-56 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 June 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1 – 7, 9 – 11, 13– 18, 41, 43 – 49, and 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mui et al. (US Patent 6235643) in view of Chang et al. (US Patent 6069091) and Hause et al. (US Patent 6051863).

3. Mui et al. teach forming an aperture in a silicon oxide layer, comprising plasma-etching with fluorine containing gas in addition to a selection from bromine containing gas and or iodine containing gas (col. 17 lines 1 – 8), thereby depositing a passivating polymer residue (508) on the sidewalls of the aperture, the aperture is tapered (col. 1 lines 60 – 67) with a slope angle greater than 87 degrees (figs 6), bromine containing gas selected from hydrogen bromide, bromine-substituted fluorocarbon, bromotrifluoromethane and bromine-substituted hydrofluorocarbon and the fluorine source selected from a group of perfluorocarbons and hydrofluorocarbons and the additional gas added prior to forming the polymer residue (col. 3 lines 4 – 28). Further taught is the use of HBr as profile control additive (col. 8 lines 8 – 17).

4. Mui et al. do not teach bromine gas and adsorption of the halogen atoms in a silicon oxide dielectric during plasma etching.

5. However, Hause et al. teach the adsorption of bromine atoms in a silicon oxide dielectric during plasma etching (col. 7 lines 34 – 37), and Chang et al. teach etching silicon oxide with bromine gas at a bias power of about 900 watts (col. 7 line 17 – col. 8 line 30).

6. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Hause/Chang et al. into the Mui et al. reference to perform an anisotropic etch with low energy ions. Adsorption of low energy ions by matter (silicon oxide) is chemistry inherent. Discovering the optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

7. Claims 8, 12, 19 – 40, 42, 50, and 52 – 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mui et al. (US Patent 6235643) in view of Hause et al. (US Patent 6051863) and Chang et al. (US Patent 6069091), and further in view of Wong et al. (US Patent 5874362).

8. The Mui/Hause/Chang et al. reference teaches the features previously outlined but lacks the step of etching with an iodinate etching gas selected from hydrogen iodide, iodine-substituted fluorocarbon, iodotrifluoromethane and iodine-substituted hydrofluorocarbon, the aperture aspect ratio is greater than 5:1, and 8:1, wherein the bottom width is greater than 60% of the top width at desired aspect ratio, and the additional gas added after forming the polymer residue, and a bias power of at least 900 watts.

9. However, Wong et al. teach etching with an iodinate etching gas selected from hydrogen iodide, iodine-substituted fluorocarbon, iodotrifluoromethane and iodine-substituted hydrofluorocarbon, the aperture aspect ratio is greater than 5:1, and 8:1 (col. 5 lines 45 – 51).

10. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Wong et al. into the Mui/Hause/Chang et al. reference to form apertures in silicon oxide with high aspect ratios. Furthermore, where the general conditions are disclosed in prior art, provision of adjustability where needed, involves only routine skill in the art. In re Stevens, 101 USPQ 284 (CCPA).

11. Prior art considered but not used in the rejections include Zhou et al. (US Patent 6017826), Trapp et al. (US Patent 6451705), and Wang et al. (US Patent 6127278).

Remarks

12. Applicant's arguments filed on June 9, 2003 have been fully considered but they are not persuasive. Applicant claims a halogen selected from a group of bromine and iodine. Therefore, choice of any halogen from the group satisfies the claim requirement. Mui et al. teach etching silicon oxide /silicon layer using a result effective parameter that prevents directional etching of silicon after a silicon oxide break through (col. 15 line 65 – col. 16 line 18) hence any aspect ratio applicable to silicon is also applicable to silicon oxide and vice versa. Should and when applicant swears behind the references of record the examiner will withdraw pertinent rejections. This rejection is to be considered a **non-final rejection**.

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Contact Information


13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Igwe U. Anya whose telephone number is (703) 308-3549. The examiner can normally be reached on M - F 8:30am - 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew S. Smith can be reached on (703) 308-1323. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Igwe U. Anya
Examiner
Art Unit 2825

IA
September 4, 2003


CARIDAD EVERHART
PRIMARY EXAMINER